

4.2 Slopes of Parallel and Perpendicular Line Segments

Where is Slope used?

Profile: The Slope of a Road

The slope of a road is called the *grade* of the road, which is the fraction $\frac{\text{rise}}{\text{run}}$ expressed as a percent. When a grade is greater than 6%, a sign is erected by the side of the road to warn traffic travelling downhill. Trucks may have to gear down to travel safely. What are the rise and the run of a road with slope 6%?



- These road signs are an easy way to warn drivers that the next hill has a greater grade (slope as a percent) than 6% which is very slippery when icy.
 - To put in perspective: a paraplegic ramp usually has a grade of 8%.
- Everything has a slope—all roads, parking lots, sewers. Each different piece has a design minimum slope in percent.
- Example: parking lot has to be above 0.50% which is 5mm of drop over 1.0m run.

Recall: Find the slope between the points (5,4) and (-3,1)

Today's Objective: To use slope to find out if two lines are parallel or perpendicular

Q: What are parallel lines?

Q: How do the slopes of parallel lines compare to one another?

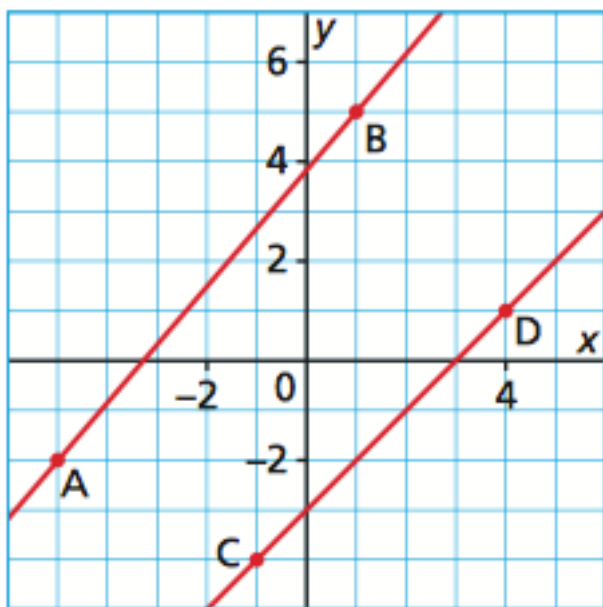
Fundamental Property of Parallel Lines:

1.

2.

Example 1: Line GH passes through $G(-4,2)$ and $H(2,-1)$ and line JK passes through $J(1,-7)$ and $K(7,3)$. Are they parallel? Justify the answer.

Example 2: Write the coordinates of the 2 labeled points on each line. Are the two lines parallel? Justify your answer.

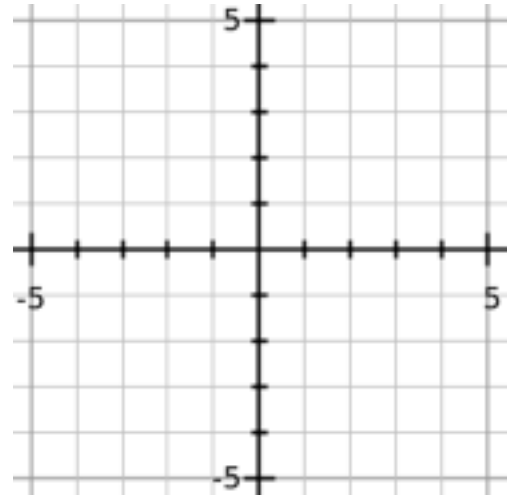


Q: What are perpendicular lines?

Example 3: Draw the line segment $(-2,-1)$, $(3,2)$.
Find the slope of this line segment.

Draw the line segment $(-2,-1)$, $(-5,4)$.
Find the slope of this line segment.

What do you notice about the two lines? What types of lines are these?



Fundamental Property of Perpendicular Lines:

- 1.
- 2.

Example 4: Determine the slope of a line that is perpendicular to the line through $E(2,3)$ and $F(-4, -1)$.

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1, 2, 3, 4, 5, 7, 8, 11